

PCT



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/EP2004/051314	International filing date (day/month/year) 30.06.2004	Priority date (day/month/year) 01.07.2003
International Patent Classification (IPC) or national classification and IPC H01L23/538, H01L21/98, H01L21/60, H01L21/68		
Applicant 3D PLUS et al.		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement according to Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>

Date of submission of the demand 31.01.2005	Date of completion of this report 11.10.2005
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PATENT COOPERATION TREATY

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/051314

Box No. I. Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
☐ international search (under Rules 12.3 and 23.1(b)).
☐ publication of the international application (under Rule 12.4).
☐ international preliminary examination (under Rule 55.2 and/or 55.3).
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation according to Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, pages

1-13 as originally filed

Claims, No.

1-18 as originally filed

Drawings, sheets

1/6-6/6 as originally filed

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
☐ the description, pages
☐ the claims, Nos.
☐ the drawings, sheets/fig
☐ the sequence listing (*specify*):
☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been as been established as if (some of) the amendments annexed to this report and listed below has not been made, since they have been considered to go beyond the disclosure as filed, as is indicated in the Supplemental Box (Rule 70.2(c)):
☐ the description, pages
☐ the claims, Nos.
☐ the drawings, sheets/fig
☐ the sequence listing (*specify*):
☐ any table(s) related to sequence listing (*specify*):

* If item 4 applied, some or all of those sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY**

International application No. PCT/EP2004/051314

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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1. Statement

Novelty	Yes:	Claims	2-13, 15-18
	No:	Claims	1, 14
Inventive Step	Yes:	Claims	-
	No:	Claims	1-18
Industrial Applicability	Yes:	Claims	1-18
	No:	Claims	-

2. Citations and explanations

see separate sheet

Concerning Point V

Reasoned assessment relating to novelty, inventive step and industrial applicability; citations and explanations to support this assessment

1. The application does not fulfill the conditions set out in Article 6 PCT, claims 1 and 17 being unclear. The order of the steps is not indicated in claims 1 and 17. The subject matter of claim 1 is consequently not novel (cf. par. 3.1).

2. The following documents are referred to:

D1: EP-A-0 611 129 (GEN ELECTRIC) 17 August 1994

D2: FR-A-2 818 804 (THOMSON CSF) 28 June 2002

D3: US 2002/175400 A1 (GERBER MARK A ET AL) 28 November 2002

D4: US 2003/045030 A1 (HAYASHIDA TETSUYA ET AL) 6 March 2003

3. The present application does not fulfill the conditions set out in Article 33(1) PCT, the subject matter of claims 1 and 14 not complying with the novelty criterion defined by Article 33(2) PCT, and the subject matter of claims 1-18 not involving an inventive step as defined by Article 33(3) PCT.

CLAIM 1

4. Document D1 describes:

A method for the interconnection of active and passive components

(capacitor 20 and chips 14, col. 5, l. 38, Fig. 1a; IC chips and passive components, col. 7, l. 50) provided with terminals (contact pads 15, col. 5, l. 51) for their interconnection, characterized in that it comprises

- positioning and fixing at least one active component and one passive component on a flat support, the terminals being in contact with the support (method for positioning contact pads of a plurality of chips ... on a planar surface, col. 1, l. 56),
- depositing a polymer layer on all of the support and said components (col. 6, l. 52-58),
- removing the support (col. 7, l. 38, separated from base 10, Figs 1b, 1c),
- redistributing the terminals between the components and/or toward the periphery by means of metal conductors arranged in a predetermined layout (col. 2, l. 38-44), making it possible to obtain a reconstituted heterogeneous structure,
- heterogeneously thinning (optionally the embodiment as indicated in Figs 8a-8e utilizes "mechanical grinding", col. 15, l. 24) said structure by nonselective surface treatment of the polymer layer and at least one passive component.

4.1 The subject matter of claim 1 is therefore not novel (Art. 33(2) PCT).

4.2 However, the order of the steps in Figure 1 of the present application is not the same as in document D1. In the rest of the communication, it will be assumed that the order of the steps is that indicated in Figure 1.

5. Document D2, which is considered to be the prior art closest to the subject matter of claim 1, describes (the references in parentheses apply to this document) a method which comprises:

- positioning and fixing at least one active component and one passive component on a flat support (p. 1, l. 9-11), the terminals being in contact with the support (p. 1, l. 18-21),
- depositing a polymer layer on all of the support and said components (p. 1, l. 22, 23),
- removing the support (p. 1, l. 25),
- redistributing the terminals between the components and/or toward the periphery by means of metal conductors (26) arranged in a predetermined layout (p. 1, l. 28-30).

5.1 The subject matter of claim 1 consequently differs from the method as described in document D1 because it comprises a thinning step after the redistribution of the terminals between the components.

5.2 The technical effect of this difference is that the component resulting has a reduced thickness.

5.3 The object of the present invention may therefore be considered as that of increasing the integration density and improving the heat conduction.

5.4 The solution proposed in claim 1 of the present application is not considered to be inventive (Article 33(3) PCT) for the following reason: according to the description given in D1, thinning has the same advantages as those mentioned in the present application (cf. col. 15, l. 29-31). Inclusion of this characteristic in the method described in document D1 therefore constitutes a normal measure for the person skilled in the art in order to achieve the object in question.

CLAIM 14

6. Document D1 describes:

a thinned heterogeneous component, characterized in that it comprises a polymer layer (substrate 24, Fig. 8c, made of polymer, col. 6, l. 52-58) having two substantially plane and parallel surfaces with one polished face (mechanically ground rear face) and one unpolished face (front face) and,

coated in said layer, at least one active component and one passive component (capacitor 20 and chips 14, col. 5, l. 38, Fig. 1a; IC chips and passive components, col. 7, l. 50), the

components having two faces, a first face provided with terminals for interconnection of the components (contact pads 15, col. 5, l. 51),

terminals of the set of components being connected by metal conductors forming a flat support in contact with the unpolished surface of said layer, and a second face (col. 2, l. 38-44, No 26 in Fig. 1e),

said second faces of the set of passive components being polished so as to form a plane surface homogeneous with said plane surface of the polymer layer (mechanically ground rear surface, col. 15, l. 24).

6.1 the subject matter of claim 1 is therefore not novel (Art. 33(2) PCT).

CLAIM 17

7. Document D1, which is considered to be the prior art closest to the subject matter of claim 17, describes (the references in parentheses apply to this document):

a method for the three-dimensional interconnection of active and passive components provided with terminals for their interconnection, characterized in that it comprises

- positioning and fixing, on a plane support, at least one passive component and at least a first active component (capacitor 20 and chips 14, col. 5, l. 38, Fig. 1a; IC chips and passive components, col. 7, l. 50),

the terminals being in contact with the support (contact pads 15, col. 5, l. 51, Fig. 1a),

- depositing a polymer layer on all of the support and said components (col. 2, l. 18, 19, Fig. 13),

- removing the support (col. 2, l. 31, 32, Figs 3b, 3c),

- redistributing the terminals between the components and/or toward the periphery by means of metal conductors, making it possible to obtain a reconstituted heterogeneous structure (col. 2, l. 38-44),

- heterogeneously thinning said structure by nonselective surface treatment of the polymer layer and the passive components (mechanical grinding, col. 15, l. 24).

7.1 The subject matter of claim 17 consequently differs from this known method because it furthermore comprises

- the use of a terminal adapter, said adapter having metal contacts on two faces which are connected to each other, one of the faces being in contact with said support and the other face lying on the other side,

- stacking and bonding a second active component on said first active component, the terminals of said second component being on the opposite face from that in contact with the first component,

- forming connections by connecting wires between the terminals of the second component and the contacts of the adapter,

7.2 The technical effect of these differences is that the method is suitable for wire connection and that it is compact.

7.3 The object of the present invention may therefore be considered as that of providing a method with the aforementioned advantages.

7.4 The solution proposed in claim 17 of the present application is not considered to be inventive (Article 33(3) PCT) for the following reasons:

7.5 According to the description given in document D3, using a connection frame has the same advantages as those mentioned in the present application (cf. par. [002], [015], [016]). Inclusion of this characteristic in the method described in document D1 therefore constitutes a normal measure for the person skilled in the art in order to achieve the object in question.

7.6 Document D3 does not describe the stacking of a second component on a first component with the faces of the components being opposite.

7.7 It is nevertheless well known to the person skilled in the art that this characteristic is equivalent to stacking a second component on a first component with the face of one component on the rear face of the other, as mentioned in document D4, and that it may depending on circumstances be replaced by the latter (cf. D4, Figs 20, 21).

DEPENDENT CLAIMS

8. Dependent claims 2-13, 15, 16 and 18 do not contain any characteristic which, in combination with those of any one of the claims to which they refer, defines subject matter satisfying the requirements of the PCT as regards novelty and/or inventive step, see the documents and corresponding passages cited in the search report.